

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 August 2002 (01.08.2002)

PCT

(10) International Publication Number  
WO 02/059923 A1

(51) International Patent Classification<sup>7</sup>: H01H 1/36

(21) International Application Number: PCT/FI02/00057

(22) International Filing Date: 24 January 2002 (24.01.2002)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:  
20010153 25 January 2001 (25.01.2001) FI

(71) Applicant (for all designated States except US): RTO  
HOLDING OY [FI/FI]; Jämsentie 14, FIN-38700 Kankaan-  
pää (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): VÄLIMÄKI, Elina

[FI/FI]; Hämeenpuisto 3 b 17, FIN-33210 Tampere (FI).  
MALMIVAARA, Mikko [FI/FI]; Jalavankatu 3 B 15,  
FIN-38700 Kankaanpää (FI). IMPIÖ, Jussi [FI/FI]; Pin-  
ninkatu 30 A 20, FIN-33500 Tampere (FI). REHO, Akseli  
[FI/FI]; Koivikkotie 3 B 18, FIN-38700 Kankaanpää (FI).

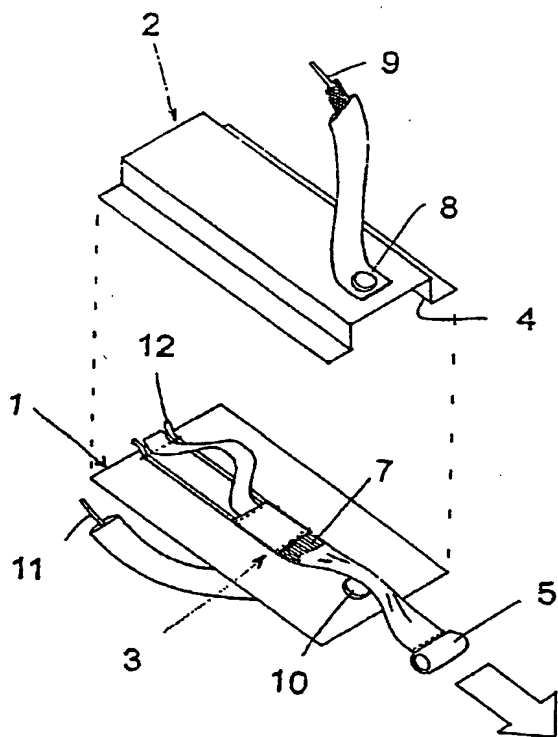
(74) Agent: BERGGREN OY AB; P. O. Box 16, FIN-00101  
Helsinki (FI).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,  
SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),

[Continued on next page]

(54) Title: SWITCH



(57) Abstract: A switch that comprises a first strip (1) with the first conductive area (8), a second strip (2) with a second conductive area (10), a gap (4) between the strips, and a tape (3) movable in the longitudinal direction of the gap, the tape comprising a conductive area (7) or an insulating area. The switch can be attached to a garment for using electronics connected with it.

BEST AVAILABLE COPY

WO 02/059923 A1



Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,  
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent  
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,  
NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— with international search report

## Switch

### Technical background

5 The present invention relates to an electric switch, especially a switch to be placed into a garment. The invention can, for example, be used in a control system for wearable electronics.

The problem especially with electronics that are to be integrated into garments is the poor usability of switches. A special problem is that the fastening base, i.e. the garment, is generally made of flexible and elastic material. On the other hand, tradi-  
10 tional switches usually require a very steady base to function, or both hands are required when using them.

### General description of the invention

15 A switch and a garment have now been invented in accordance with the independent claims. The dependent claims disclose some advantageous forms of embodiment of the invention.

The switch of the invention contains a first strip, a second strip, and an insulating gap between them. Preferably, the strips are substantially parallel. Both strips have a conductive area. At the place of the gap, there is a tape movable along it in longitudinal direction. By moving the tape, it is possible to bring the switch to a conductive  
20 state, in which electric current can travel from one strip to the other. For this purpose, the tape may include a contact area, connecting the conductive areas of the strips, or an insulating area, isolating the conductive areas of the strips.

According to one embodiment, the strips are superimposed, i.e. the wider sides towards each other. In this case, the movable tape is preferably situated between the  
25 strips. According to a second embodiment, the strips are adjacent to each other substantially in the same plane. In this case, the tape moves on top of the gap between them, for example, through loops so that the tape edges extend onto the strips.

The conductive area of either strip can be longer than that of the other. The other strip can even be conductive of its entire length.

30 The tape and the strips can preferably be moved in relation to each other in the longitudinal direction so that the tape moves and the strips are stationary.

The switch is especially suitable to be used in a garment, as the operation of the switch does not require a steady base. Its use is easy, and it can be managed as well by right-handed or left-handed people. The switch can be made small and such that it hinders the use of the garment as little as possible. A clear physical feedback (movement of the tape) is received from the operation. The tape can be provided with a puller that is easy to grasp, even with gloves on. Nevertheless, the structure of the switch is simple and reliable. The switch can be made small enough so that it does not interfere with the use of the garment. The switch can be manufactured of many kinds of materials, for example, taking into consideration the necessary strength, weather-resistance and washability. The switch can be fastened to a desired place in the garment, for example, by sewing or gluing. The appearance of the switch can be designed very freely to match the appearance of the garment as well as possible, or even as a decoration. In this case, a garment refers also generally to different kinds of accessories carried by people, such as bags, which are not used for actually covering the body.

Preferably, one end of the tape is fastened. In this case, the rear end of the tape can be flexible so that, in its normal state, the tape is retracted to posterior position, in which no contact is generated. The structure can be realised, for example, by using elastic ribbon, one end of which is fastened to the tape between its ends, and the other end is fastened to either strip. The distance of the contact area of the tape to the fastening point is preferably such that as the tape is fully extracted, the contact area comes exactly between the conductive areas of the strips.

The strips can be manufactured especially of suitably flexible film or fabric, or hard plastic or metal. The tape may, for example, consist of fabric. The contact area can be made to the tape, for example, by sewing with a conductive thread. The strips can also be curved, even round, in the direction of travel of the tape.

#### **Detailed description of some embodiments of the invention**

Some embodiments of the invention are next explained in more detail. The enclosed drawings are part of the explanation. In these

Figure 1 shows a switch of the invention opened;

Figure 2 is a cross-sectional view of parts of the switch in Fig. 1; and

Figure 3 presents a garment provided with switches according to the invention.

The main parts of the switch according to the figures are a bottom plate 1, a cover plate 2, and a tape 3 between these. The bottom plate is flat. The cover plate has in its interior for the tape a longitudinal groove 4 extending across the plate. The plates are made of suitable material to be fastened to garments, such as plastic or textile fabric. The plates are sufficiently rigid so that the tape can be moved in the groove, as the plates are compressed or bent in a way required by the use. The plates and tape are dielectric. The cover plate is attached to the bottom plate, for example, by sewing.

The tape 3 is manufactured of flexible material, such as a suitable fabric. The front end of the tape is outside the groove 4. The front end of the tape has a puller 5. The rear end 6 of the tape is attached to the rear end of the bottom plate 1. Approximately in the middle of the tape there is a contact area 7 conducting electricity through the tape. It is formed by sewing a bulging strip to the tape by using a conductive thread (for example Aracon™).

In the front end of the groove 4, the cover plate 2 comprises a cover spike 8, which conducts electricity through the plate and to which a wire 9 coated with insulation is connected. The bottom plate 1 has at the respective place a bottom spike 10, to which a wire 11 is connected. The depth of the groove, the thickness of the spikes and the thickness of the conductive strip are dimensioned so that as the contact area is at the point of the spikes, electric current can travel from one wire to the other. In this way, the circuit formed by the wires is closed.

In the middle part of the tape 3, behind the contact area 7, a rubber band 12 is attached from its front end to both sides of the tape, the rear end of the rubber band being fastened to the rear end of the bottom plate 1. The rubber bands are shorter than the rear part of the tape, which is left at the rear side of the fastening points of the front ends of the rubber bands. Thus, in the normal state, as the rubber bands are not tensioned, the contact area is found in the groove 4 at the rear side of the spikes 8, 10, and no contact is generated. As the band is pulled out straight, the contact area comes exactly between the spikes, forming a contact.

The rear part remaining between the rubber bands 12 of the tape 3 is narrower than the front part.

The switch according to Figs 1 and 2 is especially suitable for performing a one-time function. If continuous switching is required, the front end of the tape can be fastened in a suitable way in its extracted position.

Figure 3 presents a coat, the front of which is provided with two switches 13 of the above described type. The switches can very well be used also with gloves on. The switches can, for example, be used for starting a connection of a mobile means of communication for receiving or transmitting a message. For this purpose, the mobile  
5 means of communication is placed into a pocket of the coat, and the microphone and speaker connected to it are fastened, for example, to the collar.

---

---

### Claims

1. Switch, characterised in that it comprises a first strip (1) and a second strip (2) and a gap (4) between these, a first conductive area (8) in the first strip (1), a second conductive area (10) in the second strip (2), and a tape (3) movable in relation to the strips in the longitudinal direction of the gap, the tape comprising a contact area (7) or an insulating area and being movable to such a position, in which the conductive areas of the strips are isolated from each other or to such a position, in which the conductive areas are in contact with each other.
2. Switch according to claim 1, in which the tape (3) is movable in relation to stationary strips (1, 2).
3. Switch according to claim 1 or 2, in which the tape (3) has a conductive area (8).
4. Switch according to one of the claims 1 – 3, in which the strips (1, 2) are superimposed.
5. Switch according to one of the claims 1 – 4, in which the tape (3) has a rear end (6), which is fastened in relation to the strips, and a front end (5), which extends outside the gap in its longitudinal direction.
6. Switch according to one of the claims 1 – 5, in which a part (12) flexible in the longitudinal direction is connected to the tape (3).
7. Switch according to claim 6, in which the tape (3) has a rear end (6), towards which the flexible part (12) pulls the tape.
8. Switch according to claim 6 or 7, in which the tape has a contact area (7), which the flexible part (12) pulls away from the conductive areas (8, 10) of the strips.
9. Garment, to which a switch (13) has been attached for using an electronic device connected with the garment, characterised in that the switch has a first strip (1) and a second strip (2) and an insulating gap (4) between these, a first conductive area (8) in the first strip, a second conductive area (10) in the second strip, and a tape (3) movable in relation to the strips in the longitudinal direction of the gap, the tape comprising a contact area (7) or an insulating area and being movable to such a position, in which the conductive areas of the strips are isolated from each other or

to such a position, in which the conductive areas of the strips are in contact with each other.

10. Garment according to claim 9, in which the switch can be washed together with the garment.

---

---

---



**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

28/01/02

International application No.  
PCT/FI 02/00057

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
GB	1257944	A	22/12/71	BE 740478 A	17/04/70
				BR 6913397 D	00/00/00
				CH 497774 A	15/10/70
				DE 1951397 A,B	04/06/70
				ES 372645 A	01/11/71
				FR 2021098 A	17/07/70
				JP 49022110 B	06/06/74
				NL 6815010 A	21/04/70
				SE 346414 B	03/07/72
DE	2363362	A1	26/06/75	NONE	
GB	2307346	A	21/05/97	GB 9523355 D	00/00/00
US	4603327	A	29/07/86	NONE	

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER: \_\_\_\_\_**

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**